

WHAT IS CLAIMED IS:

1 1. An apparatus for processing a supervisory signal for optical network
2 applications, the apparatus comprising:

3 a subcarrier transmission system configured to receive a first supervisory
4 signal and output a second supervisory signal;

5 an electrical-to-optical conversion system configured to receive the second
6 supervisory signal and a first data signal and output a first optical signal;

7 an optical-to-electrical conversion system configured to receive the first
8 optical signal and output a first electrical signal and a second data signal;

9 a subcarrier reception system configured to receive the first electrical and
10 output a third supervisory signal;

11 wherein the second supervisory signal is associated with a first subcarrier
12 frequency;

13 wherein the first data signal is associated with a first data bandwidth, the first
14 data bandwidth including a first data frequency, at the first data frequency a power density of
15 the first data signal substantially equal to zero;

16 wherein a ratio of the first subcarrier frequency to the first data frequency
17 ranges from 0.8 to 1;

18 wherein the first optical signal is associated with a perturbation to the first data
19 signal, the perturbation being smaller than or equal to 1 dB;

20 wherein the first optical signal is associated with a signal-to-noise ratio related
21 to the first supervisory signal, the signal-to-noise ratio being larger than or equal to 20 dB;

22 wherein the first supervisory signal is associated with a first subcarrier data
23 rate larger than 1 Mbps.

1 2. The apparatus of claim 1 wherein the first subcarrier signal is
2 associated with the first subcarrier data rate larger than 5 Mbps.

1 3. An apparatus for processing a supervisory signal for optical network
2 applications, the apparatus comprising:

3 a subcarrier transmission system configured to receive a first supervisory
4 signal and output a second supervisory signal;

5 an electrical-to-optical conversion system configured to receive the second
6 supervisory signal and a first data signal and output a first optical signal;

7 an optical-to-electrical conversion system configured to receive the first
8 optical signal and output a first electrical signal and a second data signal;
9 a subcarrier reception system configured to receive the first electrical signal
10 and output a third supervisory signal;
11 an optical system coupled to the electrical-to-optical conversion system and
12 the optical-to-electrical conversion system;
13 wherein the second supervisory signal is associated with a first subcarrier
14 frequency;
15 wherein the first data signal is associated with a first data bandwidth, the first
16 data bandwidth including a first data frequency, at the first data frequency a power density of
17 the first data signal substantially equal to zero;
18 wherein a ratio of the first subcarrier frequency to the first data frequency
19 ranges from 0.8 to 1.

1 4. The apparatus of claim 1 wherein the first data frequency is a
2 maximum frequency associated with the first data bandwidth.

1 5. The apparatus of claim 4 wherein the first data frequency is
2 substantially equal to 2.5 GHz and the first subcarrier frequency is substantially equal to 2.4
3 GHz.

1 6. The apparatus of claim 5 wherein the first data signal is associated with
2 a non-return to zero format and a first data rate substantially equal to or smaller than 2.5
3 gigabits per second.

1 7. The apparatus of claim 6 wherein the first optical signal is associated
2 with a perturbation related to the first data signal, the perturbation being smaller than or equal
3 to 1 dB, the first optical signal is associated with a signal-to-noise ratio related to the first
4 supervisory signal, the signal-to-noise ratio being larger than or equal to 20 dB.

1 8. The apparatus of claim 7 wherein the first supervisory signal is
2 associated with a first supervisory data rate larger than 1 Mbps.

1 9. The apparatus of claim 8 wherein the first supervisory data rate is
2 about 5 Mbps.

1 10. The apparatus of claim 3 wherein the subcarrier transmission system
2 comprises:

3 a subcarrier modulator configured to receive the first supervisory signal;
4 a first band pass filter coupled to the subcarrier modulator and configured to
5 output the second supervisory signal.

1 11. The apparatus of claim 10 wherein the subcarrier reception system
2 comprises:

3 a second band pass filter configured to receive the first electrical signal;
4 a subcarrier demodulator coupled to the second band pass filter and configured
5 to output the third supervisory signal;
6 wherein the third supervisory signal is substantially the same as the first
7 supervisory signal.

1 12. The apparatus of claim 11 wherein the optical-to-electrical conversion
2 system comprises:

3 an optical-to-electrical signal converter configured to receive the first optical
4 signal and configured to output the first electrical signal and an electrical signal;
5 a clock and recovery system configured to receive the electrical signal and
6 output the second data signal;

7 wherein the second data signal is substantially the same as the first data signal.

1 13. The apparatus of claim 12 wherein the electrical-to-optical conversion
2 system comprises:

3 a laser source configured to receive the second supervisory signal;
4 an electrical-to-optical modulator coupled to the laser source and configured to
5 receive at least the first data signal and output the first optical signal.

1 14. The apparatus of claim 12 wherein the electrical-to-optical conversion
2 system comprises an electrical-to-optical signal converter configured to receive the second
3 supervisory signal and the first data signal and output the first optical signal.

1 15. A method for processing a supervisory signal for optical network
2 applications, the method comprising:
3 receiving a first supervisory signal;

4 processing information associated with the first supervisory signal;
5 outputting a second supervisory signal based on at least information associated
6 with the first supervisory signal;
7 receiving the second supervisory signal and a first data signal;
8 processing information associated with the second supervisory signal and the
9 first data signal;
10 outputting a first optical signal based on at least information associated with
11 the second supervisory signal and the first data signal;
12 receiving the first optical signal;
13 processing information associated with the first optical signal;
14 outputting a first electrical signal and a second data signal based on at least
15 information associated with the first optical signal;
16 receiving the first electrical signal;
17 processing information associated with the first electrical signal;
18 outputting a third supervisory signal;
19 wherein the second supervisory signal is associated with a first subcarrier
20 frequency;
21 wherein the first data signal is associated with a first data bandwidth, the first
22 data bandwidth including a first data frequency, at the first data frequency a power density of
23 the first data signal substantially equal to zero;
24 wherein a ratio of the first subcarrier frequency to the first data frequency
25 ranges from 0.8 to 1.

1 16. The method of claim 15 wherein the first data frequency is a maximum
2 frequency associated with the first data bandwidth.

1 17. The method of claim 16 wherein the first data frequency is
2 substantially equal to 2.5 GHz and the first subcarrier frequency is substantially equal to 2.4
3 GHz.

1 18. The method of claim 17 wherein the first data signal is associated with
2 a non-return to zero format and a first data rate substantially equal to or smaller than 2.5
3 gigabits per second.

1 19. The method of claim 18 wherein the first optical signal is associated
2 with a perturbation related to the first data signal, the perturbation being smaller than or equal
3 to 1 dB, the first optical signal is associated with a signal-to-noise ratio related to the first
4 supervisory signal, the signal-to-noise ratio being larger than or equal to 20 dB.

1 20. The method of claim 19 wherein the first supervisory signal is
2 associated with a first supervisory data rate larger than 1 Mbps.

1 21. The apparatus of claim 20 wherein the first supervisory data rate is
2 about 5 Mbps.

1 22. The method of claim 15 wherein the processing information associated
2 with the first supervisory signal comprises:
3 modulating the first supervisory signal;
4 filtering the modulated first supervisory signal.

1 23. The method of claim 22 wherein the processing information associated
2 with the first electrical signal comprises:
3 filtering the first electrical signal;
4 demodulating the filtered first electrical signal.

1 24. The method of claim 23 wherein the processing information associated
2 with the first optical signal comprises:
3 converting the first optical signal to an electrical signal;
4 reducing signal distortion associated with the electrical signal.

1 25. The method of claim 24 wherein the processing information associated
2 with the second supervisory signal and the first data signal comprises:
3 generating a laser signal in response to at least the second supervisory signal;
4 modulating the laser signal with the first data signal;
5 converting the modulated laser signal to the first optical signal.

1 26. The method of claim 24 wherein the processing information associated
2 with the second supervisory signal and the first data signal comprises converting the second
3 supervisory signal and the first data signal into the first optical signal.

1 27. An apparatus for transmitting a supervisory signal for optical network
2 applications, the apparatus comprising:
3 a subcarrier transmission system configured to receive a first supervisory
4 signal and output a second supervisory signal;
5 an electrical-to-optical conversion system configured to receive the second
6 supervisory signal and a first data signal and output a first optical signal;
7 wherein the second supervisory signal is associated with a first subcarrier
8 frequency;
9 wherein the first data signal is associated with a first data bandwidth, the first
10 data bandwidth including a first data frequency, at the first data frequency a power density of
11 the first data signal substantially equal to zero;
12 wherein a ratio of the first subcarrier frequency to the first data frequency
13 ranges from 0.8 to 1.

1 28. An apparatus for receiving a supervisory signal for optical network
2 applications, the apparatus comprising:
3 an optical-to-electrical conversion system configured to receive a first optical
4 signal and output a first electrical signal and a second data signal;
5 a subcarrier reception system configured to receive the first electrical signal
6 and output a third supervisory signal;
7 wherein the subcarrier reception system includes a band pass filter associated
8 with a first subcarrier frequency;
9 wherein the second data signal is associated with a first data bandwidth, the
10 first data bandwidth including a maximum data frequency;
11 wherein a ratio of the first subcarrier frequency to the maximum data
12 frequency ranges from 0.8 to 1.

1 29. A method for transmitting a supervisory signal for optical network
2 applications, the method comprising:
3 receiving a first supervisory signal;
4 processing information associated with the first supervisory signal;
5 outputting a second supervisory signal based on at least information associated
6 with the first supervisory signal;
7 receiving the second supervisory signal and a first data signal;

8 processing information associated with the second supervisory signal and the
9 first data signal;
10 outputting a first optical signal based on at least information associated with
11 the second supervisory signal and the first data signal;
12 wherein the second supervisory signal is associated with a first subcarrier
13 frequency;
14 wherein the first data signal is associated with a first data bandwidth, the first
15 data bandwidth including a first data frequency, at the first data frequency a power density of
16 the first data signal substantially equal to zero;
17 wherein a ratio of the first subcarrier frequency to the first data frequency
18 ranges from 0.8 to 1.

1 30. A method for receiving a supervisory signal for optical network
2 applications, the method comprising:
3 receiving a first optical signal;
4 processing information associated with the first optical signal;
5 outputting a first electrical signal and a second data signal based on at least
6 information associated with the first optical signal;
7 receiving the first electrical signal;
8 processing information associated with the first electrical signal;
9 outputting a third supervisory signal;
10 wherein the processing information associated with the first electrical signal
11 includes filtering the first electrical signal;
12 wherein the filtering the first electrical signal is associated with a first
13 subcarrier frequency;
14 wherein the second data signal is associated with a first data bandwidth, the
15 first data bandwidth including a maximum data frequency;
16 wherein a ratio of the first subcarrier frequency to the maximum data
17 frequency ranges from 0.8 to 1.